



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Masahiro HAMADA et al.

Serial No. : 10/530,981

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For : PROCESS FOR THE PRODUCTION OF
SULFOALKYL-CONTAINING POLYMERS

Examiner : Marc S. Zimmer

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[Signature]
Signature
February 28, 2007
Date

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

DECLARATION UNDER 37 C.F.R. §1.132

I, Masahiro HAMADA, a citizen of Japan residing at 2-336, Kitabukuro-cho, Omiya-ku, Saitama-shi, Saitama 330-0835 Japan, hereby declare:

That I am currently a research scientist of Technology Development Group in the Functional Chemicals R&D

Laboratories of the Research & Development Group of NIPPON KAYAKU KABUSHIKI KAISHA, and have been in that position since 2004;

That I hold a Master of Integrated Biosciences Degree in 2001 from University of Tokyo;

That I have reviewed the above-referenced patent application as well as the Office Actions, and I am familiar with its prosecution and the cited reference; and

That the following experiments were conducted by me or under my supervision, to prepare sulfomethylated poly-ether sulfone by the following experiments according to the method disclosed in Embodiment 14 (2) (Column 22, paragraphs 0260-0263) of US 2005/0271922 A1 (Kubota et al.), and determine an ion-exchange capacity (the equivalent weight of ion-exchange group) of the compounds obtained by the method of Embodiment 14 (2).

(I) Experiment:

After substituting the air inside of a 300-ml 4-neck round bottom flask with a stirrer, a thermometer, a reflux condenser, and a desiccant tube (containing calcium chloride in it) by nitrogen gas, we put 10.3 g of chloro-methylated poly-ether sulfone, 50 ml of dry nitro benzene, and 30.6 g of sodium sulfate into the flask, and stirred the mixture at 100 degree Celsius for 5 hours. Further, we added 10 ml of deionized water and stirred the solution for five hours. Next, products were precipitated by dropped the reactant solution into 500 ml of methanol, and the precipitate was separated by filtering. Washing the separated precipitate with methanol and filtering it under reduced pressure were carried out twice, and then the obtained products were dried at 75 degree celsius.

The chloro-methylated poly-ether sulfone used in this check experiment was prepared by the method disclosed in Experiment 1 of JP 2005-126532 A1.

The recovering method of the reaction products was different from the method disclosed in Embodiment 14 (2) of Kubota et al. which is the recovering method of sulfo-methylated poly-ether sulfone by dropping the reactant solution into deionized water, because the recovering efficiency of sulfo-mathylated poly-ether sulfone by dropping into methanol was higher than that by dropping into deionized water.

(II) Experimental results:

After Nuclear Magnetic Resonance (NMR) determination of the products obtained by the above procedure, we found that the products obtained were seemed to contain only the chloro-methylated poly-ether sulfone, because the chemical shifts of methylene part of the products were 4.89 ppm although those of raw materials were 4.86 ppm.

Furthermore, measured ion-exchange capacity of the products was 0.03 mmol/g (= meq/g) which is equal to 29400 g/mol as the equivalent weight of sulfonic acid group, and the products scarcely indicates the ion-exchange ability.

(III) Consideration on the results:

As far as our check experiments according to the method disclosed in Embodiment 14 (2) of Kubota et al., a sulfomethylated resin (sulfomethylated poly-ether sulfone) having enough ion-exchange ability was not prepared, while Kubota et al. discloses that sulfomethylated poly-ether sulfone having 600g/mol of the equivalent weight of ion-exchange group was prepared.

Comparative example 3 described in the specification of this application also teaches that substitution of chloro atoms on chloro-methylated poly-ether sulfone to sulfo groups by sodium sulfonate could not be scarcely occurred, although the reaction condition is slightly different from the above mentioned check experiment.

Accordingly, I suppose you could understand that the results of this check experiments is reliable.

I further declare that all statements made herein of my own knowledge are true and that all statements made upon information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 101 of Title 18 of the United States Code and that such willful false statement may jeopardize the validity of the above identified application or any patent issuing thereon.

Masahiro Hamada
Masahiro HAMADA

February 16, 2007.
Date